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Callophrys (*Sandia*) *mcfarlandi* Ehrlich and Clench, new species

Holotype (male) on left, and allotype (female) on right; upper surfaces above, lower surfaces below.

ENTOMOLOGICAL NEWS

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A New Subgenus and Species of Callophrys (*s.l.*) from the Southwestern United States (Lepidoptera: Lycaenidae)

By PAUL R. EHRLICH, Natural History Museum, Stanford University, Stanford, California, and HARRY K. CLENCH, Carnegie Museum, Pittsburgh 13, Penna.

Through the kindness of Mr. Noel McFarland, of the University of Kansas, we were permitted to examine a remarkable, but unfortunately unique, specimen of a hairstreak that he had taken in the Sandia Mts. of New Mexico in the spring of 1958. Although it is risky to draw conclusions from single specimens we had little doubt that this specimen represented a new and strikingly distinct species. It was, of course, evident that additional material was urgently needed.

Acting on this, the following spring P. R. E. joined forces with Mr. Don B. Stallings and Mr. J. R. Turner and their families to make a frontal attack on the locality. Its success was a collector's dream: not only was a good series netted, but the larval food plant was discovered and a good series of larvae in various stages of development was also obtained. Some of these were preserved and some left alive to continue growth, which they readily did, yielding pupae and a further series of adults later.

Mr. McFarland returned again to the Sandias, in time to secure additional material, confirming the presence of a second brood and at the same time discovering additional colonies of the species in the area.

Unfortunately, the forthcoming appearance of a new book ("How to Know the Butterflies") by one of us (P. R. E.) has

forced us to present this rather abbreviated description now, to make the name available for inclusion there. We intend to follow the present paper with a more detailed and extended treatment of the species, its variation and affinities. A separate account, by Stallings, Turner and Ehrlich, will cover the life history in detail.

Genus **CALLOPHRYS** Billberg 1820

Subgenus **Sandia** Clench and Ehrlich, new subgenus

Type species: *Callophrys* (*Sandia*) *mcfarlandi* Ehrlich and Clench, n. sp.

Shown to be a member of the genus *Callophrys* by the following characters: eyes moderately hairy; mid and hind tibiae each with a single pair of spurs. Male genitalia: penis with two terminal, terminally dentate cornuti, at least one upcurved; tip of penis flared, ventral margin projecting farther than dorsal, lacking a midventral distal serrate keel; valvae contiguous, or nearly so, to tips, the tips without setae.

Within the genus it is uniquely characterized by the following combination of traits: upperside gray brown and fulvous, without blue; male scent pad about three times as long as wide, with definitely dentate androconia; hind wing without tails; underside green with brassy fulvous underscaling, pattern elements largely suppressed save for a well developed, evenly curved postmedian (pm) line on both wings and variable traces of subterminal elements on the hind wing. Palpi about 1.9 to 2.3 times as long as vertical diameter of eye; endodont of tarsal claw present, short and bluntly rounded; basitarsus inflated. Male genitalia with saccus rather short and blunt; cornuti slender; penis comparatively short (2.3 times as long as valva); tips of valvae "capped" (i.e., with a small, sharply delimited, terminal thickening on each).

Within the genus the long palpi are unique (in all others it ranges from 1.1 to 1.5, rarely 1.6, times as long as vertical eye diameter); the capped valvae are shared only with *Callophrys* (*Mitoura*) *xami* and *C.* (*Incisalia*); and the distinctly dentate

androconia only with *xami*, though this character is rather variable and therefore of only limited use. Absence of tails is characteristic of *C.* (*Callophrys*) and *C.* (*Incisalia*); the dominant, simply curved pm line below typical of *C.* (*Callophrys*). The green color below is shared with *C.* (*Callophrys*) and many *C.* (*Mitoura*) as well, while the brassy fulvous on both surfaces is similar to that in *xami* and several other *C.* (*Mitoura*).

Callophrys (Sandia) mcfarlandi Ehrlich and Clench, n. sp.

Male. Upperside. Fore wing gray with fulvous tint, darkening towards costa and apex to gray brown; veins gray; termen narrowly dark brown; scent pad about as long as width of cell, about three times as long as wide, dull black; fringe pale gray, darkening costad and darker basad throughout. Hind wing yellow fulvous, brightest tornally, gradually becoming grayer costad and basad; a narrow black terminal band from Rs to tornus; inner margin gray beyond 2A; fringe pale gray, darker distally, becoming almost black tornally; at Cu_1 and Cu_2 a few long, pure white scales cut the fringe and project very slightly beyond. Termen regularly rounded.

Underside. Fore wing golden fulvous with bright brassy green largely filling discal cell, tinging the fulvous slightly along costa and filling most of the space between the pm line and termen above Cu_1; base of cell Cu_2 gray; inner margin below 2A slightly brassy pale gray; a pm line, very regular and parallel to termen from costa to Cu_2, about as far from termen as distal width of cell Cu_1; this line composed of a distal pure white band, a central black line (about half as thick as the white) and traces of a basal orange fulvous edging; termen narrowly edged black, within which are a few white scales occasionally in cells Cu_1, Cu_2; fringe as on upperside. Hind wing largely green, basally with black scales intermixed, especially prominent in older specimens; pm line similarly regular and close to termen (about twice the distal breadth of cell Cu_1) and parallel to termen throughout except costally, where it approaches termen, intersecting it at end of Sc. Structure of this line as on fore wing but all parts a little thicker, the basal fulvous becoming a

definite orange fulvous band; in cells Cu_1, Cu_2 and 2A the line is feebly crenulate, the segments concave outward; a pure white band, as thick as the white of pm line, follows termen from Sc (where it unites with pm white) to tornus, slightly toothed basad at each vein; immediately distad a slender black line follows termen similarly; between the two white lines the green darkens slightly distad by admixture of black scales between veins, and in median and cubital interspaces, almost touching pm line, a few white scales, followed distally by obsolescent black bars, very thin and faint, often absent, beyond which the green may occasionally be yellowed in faint lunule-shaped caps to the darker green beyond: these white scales, black bars and yellowish lunules being the sole remnants of subterminal markings, always faint, and often nearly absent; apparently better developed in second brood specimens. Fringe as on upperside.

Female. Upperside. Fore wing as in male with these exceptions: fulvous much more extensive, leaving dark brown areas only in cell, narrowly along costa and termen, thicker at apex; scent pad of course absent; fringe nearly pure white distally. Hind wing likewise brighter, more orange, basal darkening more basally restricted; termen nearly straight between M_1 and Cu_1, then at Cu_1 abruptly angled, straight thence to tornus. Fringe purer white, but similarly darkened distally.

Underside as in male, but usually between Rs and inner margin with the series of black bars, basally white-edged, running very close to pm line, more prominent than in males.

Length of fore wing: holotype, male, 15 mm. (expanse 29.5 mm.); allotype, female, 14 mm. (expanse 28 mm.).

Holotype, male, La Cueva Canyon, 6300 ft., west slope of Sandia Mts., Bernalillo Co., NEW MEXICO, 31.v.1959 (Noel McFarland, *leg.*).

Allotype, female, same locality, ex larva on *Nolina microcarpa* taken 19.v.1959, emerged 7.vi.1959 (Stallings, Turner & Ehrlich, *leg.*).

Paratypes, as follows: 1 male, 4.v.1958 (N. M., *leg.,* the first specimen taken of the species); 2 males, 9 females, 18.v.1959 (S., T., & E., *leg.*), one of the females preserved in fluid; 3

males, 9 females, 19.v.1959 (S., T., & E., *leg.*); 1 male, 1 female, ex larvae coll. 18–19.v.1959 (S., T., & E., *leg.*) emerged 6.vi.1959; 2 males, 5 females, ex larvae coll. 19.v.1959 (S., T., & E., *leg.*), emerged 7.vi.1959; 17 males, 2 females, 31.v.1959 (N. M., *leg.*); 3 females, ex larvae coll. 18–19.v.1959 (S., T., & E., *leg.*), emerged 8.vi.1959: all the preceding from the same locality as holotype. In addition there are paratypes from Tijeras, Hwy 66, Sandia Mts., Bernalillo Co., all N. McFarland, *leg.*, as follows: 3 males, 31.v.1959; 1 male, 7 females, 1.vi.1959.

Holotype and allotype are deposited in the American Museum of Natural History. Paratypes will be variously distributed, including deposition in the following collections: Noel McFarland, Stallings-Turner, British Museum, Carnegie Museum, Los Angeles Co. Museum.

Remarks. The life history will be described and discussed in detail in a future publication (see introduction). We may summarize it briefly as follows: The foodplant is beargrass (*Nolina microcarpa* S. Watson), a local plant that occurs from the panhandle of Oklahoma westward to Arizona and south into northern Mexico. The larvae feed on the flower heads, where they may be found by careful search. There are apparently two closely spaced generations a year, the first from about the first of May to the third week or so of the same month; the second from about the end of May into June. The species overwinters as a pupa.

It is a remarkable coincidence that two specimens, a male and a female, were taken some 300 miles away in western Texas by J. M. and S. N. Burns, while on a collecting trip for *Erynnis* (Hesperiidae). Both were taken in the Davis Mts., Jeff Davis Co., Texas, as follows: 1 male, Limpia Canyon, 5000 ft., 4 mi. WNW of Ft. Davis, 28.iv.1959; 1 female, HO Canyon, 6000 ft., 29.iv.1959.

It is a pleasure to name this new species for Mr. Noel McFarland, who collected the first specimen and who materially aided in collecting the type series.

Some Robber-Fly Records (Diptera: Asilidae)[1]

By Robert E. Woodruff, Department of Entomology,
State Plant Board of Florida, Gainesville, Florida

Diogmites missouriensis Bromley

In July, 1953, the writer was stationed at Fort Knox, Kentucky, for training with the U. S. Army Reserves. On several occasions a robber-fly of the genus *Diogmites* was noted flying about the tents and frequently alighting on the tent pegs. Although little time was available for collecting specimens, on July 30, 1953, seven specimens of this species were secured without the aid of a net. Apparently the species was just emerging as evidenced by a teneral specimen and the extremely slow flight of all individuals.

The specimens were tentatively identified by Robert M. Goslin, of the Ohio State Museum, as *Diogmites missouriensis* Bromley. Since this species was known to be quite rare, the specimens were sent to the late Dr. Stanley W. Bromley, who verified this identification. This constitutes the first record of the species for Kentucky and nearly doubles the number of previously known specimens. This insect is now known from four states in the Mississippi Valley. Other records which have been added through the courtesy of Robert M. Goslin, increase the total number of known specimens to twenty-two.

The following records summarize the known distribution of this rare species. The type series contained eight specimens from Missouri, two from Ohio, and one from Mississippi. In addition to the above specimens from Fort Knox, Kentucky, the Ohio State University collection contains one from the same locality, collected by R. D. Alexander. Other records are: one specimen from Jackson County, Ohio, and one from Ross County, Ohio, both collected in July, 1952, William Goslin; and one specimen from Highland County, Ohio, July, 1953, R. M. Goslin.

[1] Contribution No. 3, Entomology Department, State Plant Board of Florida.

Heteropogon macerinus Walker

On September 3, 1956, the writer and Richard D. Alexander camped at the end of an abandoned dirt road near Rocky Mount, Virginia. While walking along this road in search of tiger beetles, the writer noted a pale-colored robber fly sitting in the dry, hard-packed wheel ruts of the road. The specimen did not move, and on closer examination, proved to be teneral. A cast pupal skin was found only a few inches away and, on further search, seven more specimens were found near their pupal skins in the same type of situation.

The most surprising part of this collection is the fact that our car had been driven over the exact same spot the previous night. I immediately wondered how these delicate teneral insects could withstand such pressure. However, on second thought, I came to the conclusion that the pressure from the weight of the car probably loosened the otherwise hard soil and assisted the imagoes in emergence. All specimens were found directly in the ruts made by automobile tires.

Laphria index McAtee

This species is reported by Bromley (1931) as rare in Ohio and, therefore, the following collection is thought worthy of note: one male, Champaign County, Ohio, July 7, 1950, R. E. Woodruff.

Laphria ithypyga McAtee

Bromley (1947: 67–68) records this species from only one locality in Ohio. The writer collected a single specimen on June 15, 1951, in Champaign County, Ohio, to add another record.

Holcocephala fusca Bromley

Although this species does not seem to be rare (at least in Ohio), there has been little information published, regarding distribution, since the original description. Numerous specimens were collected by the writer in Champaign County, Ohio,

in August, 1952, and a single specimen was found at Indian Lake, Logan County, Ohio, August 18, 1951.

All of the above mentioned specimens are presently located in the Ohio State Museum, Columbus 10, Ohio.

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Nomenclature Notice

All comments relating to the following should be marked with the Commission's File Number and sent in duplicate, as soon as possible, and in any case, before October 8th, to W. E. CHINA, Assistant Secretary, International Commission on Zoological Nomenclature, c/o British Museum (Natural History), Cromwell Road, London, S. W. 7, England.

Validation of the generic name **Delphax** Fabricius, 1798 (Order Hemiptera). Z.N. (S)47.

Designation of a type-species for the nominal genus **Macropsis** Lewis, 1843 (Order Hemiptera). Z.N. (S)456.

Suppression of the generic name **Promecopsis** Duméril, 1806 (Order Hemiptera). Z.N. (S)483.

Suppression of the specific name **longicorne** Latreille, 1804 (*Acrydium*) (Order Orthoptera). Z.N. (S)675.

Stabilization of the names of the North European species of **Tipula oleracea** group (Order Diptera). Z.N. (S)896.

Validation of the familiar usage of the generic name **Tanytarsus** van der Wulp, 1874 (Order Diptera). Z.N. (S)1245.

Designation of a neotype for the nominal species **Dytiscus cinereus** Linnaeus, 1758 (Order Coleoptera). Z.N. (S)1389.

Validation of the generic name **Acilius** Leach, 1817 (Order Coleoptera). Z.N. (S)1391.

Validation of the specific name **dardanus** Brown, 1776 (*Papilio*) (Order Lepidoptera). Z.N. (S)1403.

For details see Bull. Zool. Nomencl. Vol. 17, Parts 6/8.

A New Tephritid Genus, Rhagoletoides, with Notes on its Distribution and Systematic Position (Diptera, Tephritidae)[1]

By Richard H. Foote, Entomology Research Division, Agr. Res. Serv., U.S.D.A., Washington, D. C.

A study of New World tephritids being conducted by the writer reveals that *Spilographa latifrons* van der Wulp (1889) belongs to neither of the genera to which it has been assigned nor to any other described genus. A new genus is herewith provided; its justification is detailed in a discussion to be found at the end of this paper. The heretofore unrecorded presence of this species within the continental United States is also set forth.

Genus **RHAGOLETOIDES**, new genus

Diagnosis. Frons yellow, with numerous slender, short, black setae, slightly wider than 2.0 times the width of one eye from above; three pairs lower fronto-orbitals; two pairs upper fronto-orbitals, the posterior pair reclinate, not convergent, both pairs situated on shiny yellow triangular areas similar in size to the large ocellar triangle. Antenna yellow; third segment rounded apically, not acuminate; arista dark, very finely haired, the hairs about the same length as basal diameter of arista. Face in profile slightly receding but not at all concave; with a rather deep antennal fossa on each side of a wide, flattened central carina which widens from antennal base to oral margin. Post-oculars extremely slender and short.

Thorax brownish yellow with a narrow, yellow, sublateral stripe extending from posterior margin of humerus to wing base; mesonotum covered by short, dark hairs and coarse golden pollen except in small dark areas at bases of dorsocentrals and inner ends of suture; posterior supra-alar, inner alar, and acrostical nearly in a line very close to scutellum; dorsocentral

[1] Miss Marian Adachi has made it possible for me to examine the Tephritidae in, and to use the collection records from, the University of Arizona collection. For this privilege I am deeply grateful.

in line with acrostical and anterior supra-alar and in a transverse line not quite halfway between one connecting anterior supra-alars and one connecting acrosticals; two pairs scutellars. Apical halves of mid and hind femora each with an antero-ventral and a postero-ventral row of short, stout, pointed bristles.

Abdominal terga brown with short, black setae; apical third to half of terga I to III with golden pollen similar to that on mesonotum, the basal portions of terga I to III and all of terga IV and V subshining but slightly darker brown than thoracic pleurae.

Rhagoletoides latifrons (van der Wulp), n. comb.

Spilographa latifrons van der Wulp, 1899, *in* Godman and Salvin, Biologia Centrali-Americana. Insecta. 2: 407; Pl. XI, fig. 26.—Aldrich, 1905, Smithsn. Misc. Collect. 46(1444): 604.

Phorellia latifrons: Hendel, 1914, Abh. u. Ber. Mus. Dresden 14: 28.—Aczél, 1949, Acta Zool. Lilloana 7: 250.

? *Spilographa obfuscata* van der Wulp, 1899, *in* Godman and Salvin, Biologia Centrali-Americana. Insecta. 2: 406; Pl. XI, fig. 25.—Aldrich, 1905, Smithsn. Misc. Collect. 46(1444): 604.

? *Phorellia obfuscata:* Hendel, 1914, Abh. u. Ber. Mus. Dresden 14: 28.—Aczél, 1949, Acta Zool. Lilloana 7: 250.

Description. As in the diagnosis of the genus, with the following additions: In profile eye suboval; cheek 0.25 times as high as eye, its bristle situated well behind posterior margin of eye; antenna 0.5 times as long as face; face light yellow, contrasting strongly with the much darker yellow frons and antenna, covered with silvery pollen visible only at an angle to surface. Mesonotum in some specimens with ill-defined, paired dark marks halfway between suture and anterior margin of mesonotum. Dark bands covering veins r-m and m separated completely or meeting with various degrees of fusion at posterior wing margin; inner margin of dark spot in apices of cells R_3 and R_5 with various shapes, the extent of the spot never greater than that shown by Benjamin (1934). Legs brown, concolorous with thoracic pleurae, fore and mid trochanters

somewhat brighter yellow. Abdomen in some males with an ill-defined triangular dark brown to black spot proximally in the centers of terga II and III; male with tergum IV about 1.8 times as long as tergum III; female with tergum V about 0.25 times as long as tergum IV; ovipositor sheath covered with short, black setae, very dark brown, about 2.0 times as long as tergum V and 0.5 times as long as tergum IV.

Material examined and distribution. United States: 1 ♂, Catalina Mts., Arizona, 14.VIII.1954, G. Bohart, G. Butler (Univ. Arizona, Tucson). Mexico: 3 ♂♂, 1 ♀, San Juan del Rio Oro, Querétaro, 6.VIII.1949, H. G. Hawkes (USNM); 4 ♂♂, 1 ♀, Mt. Orizaba, Arriba de Temalaquilla, Veracruz, 17.VIII.49, J. C. Hawkes (USNM). The type locality of *latifrons* as given by Wulp (1899) is "Ciudad in Durango, 8100 feet." It is a high altitude and dry area species having its principal distribution south of the United States border. Because *latifrons* has never been previously collected in the southwestern United States, an area fairly well known as far as the family Tephritidae is concerned, one may safely regard it as being an extremely rare species in this country.

Discussion

Van der Wulp's association (1899) of the name *Spilographa* with *latifrons* is untenable, since that name has been shown to be a synonym of *Rhagoletis* Loew. The name *Phorellia* is applied by Hendel (1914) and Aczél (1949) in the sense of Rondani (1870), placing *latifrons* in the genus *Trypeta* Meigen, also an incorrect association (see Foote, in press). For the reasons explained below, *latifrons* must have a taxon at the zoological level of *Trypeta, Rhagoletis,* and others.

The wing pattern of *latifrons* resembles that of three American tephritid species in having (a) two brown oblique bands lying upon and parallel to veins r-m and m, respectively, forming the arms of a V with their posterior ends close together or touching at the posterior wing margin, and (b) a short dark mark between the arms originating at the costa and proceeding posteriorly well into cell R_3. One of these species, *Rhagoletis*

basiola (O.S.), is illustrated by Phillips (1923; Pl. XVIII, figs. 9 and 10) as *Zonosema flavonotata* (Macq.) and *Zonosema setosa* (Doane), respectively; by Stone (1951: 46; fig. 3); and by Balduf (1959; Pl. 1; fig. 3). The other two species are presently assigned to the genus *Zonosemata* Benjamin. One of these, *electa* (Say), is well illustrated by Benjamin (1934: 34; fig. 15). The wing of *vittigera* (Coq.), the other species of *Zonosemata,* is so similar to that of *electa* that Benjamin's illustration can pass for both species for the purposes of this discussion.

In spite of their similarity to *latifrons* in wing pattern and habitus, the aforementioned representatives of *Zonosemata* and *Rhagoletis* have quite different structural characters on a generic level, which sets *Rhagoletoides* quite apart. They lack the antero- and postero-ventral rows of mid and hind femoral spines, the dorsocentrals are situated farther forward, the third antennal segment is acuminate dorso-apically, and the pollinosity of the abdominal tergites, if present, is never golden in color.

The structurally related genera of the typical tribe of the subfamily Trypetinae, to which all three genera so far mentioned belong, are *Trypeta* Meigen, *Euleia* Walker, and *Chaetostoma* Rondani. From *Trypeta,* the new genus described herein may be distinguished by the rounded head shape and extremely wide frons; from *Euleia* by the position of vein r-m, which in *Rhagoletoides* is situated at the midpoint of cell 1st M_2; from *Chaetostoma* by the lack of strong bristles at the anterior oral margin; and from all three by the characteristic wing pattern.

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Some Predators of the Clover Mite

By ROBERT SNETSINGER, Illinois Natural History Survey, Urbana, Illinois

The clover mite, *Bryobia praetiosa* Koch, feeds on a wide range of plants and is a serious pest of fruit trees, some ornamental plants, and a few truck and field crops. In addition, this mite is a common household nuisance problem in many newly developed residential areas. Predators play an important role in reducing clover mite populations to non-destructive levels. From 1954 to 1958, I collected 23 species of predators of the clover mite at Urbana, Illinois. These observations bring to 62 the number of known predators (List 1).

Of these 62 species, 8 are spiders, 15 are mites, 5 each are thrips, anthocorid bugs, and mirid bugs, 15 are coccinellid beetles, and the rest are in other families and orders of terrestrial arthropods. Of the 23 species from Urbana (List 1, denoted by asterisk), 3 are spiders, 8 are mites, 3 are thrips, 4 are coccinellids, and the remainder are in other groups. According to the studies of Lord (1949), Anderson and Morgan (1958), and other papers of a less general nature, mites, thrips, anthocorid bugs, mirid bugs, and coccinellid beetles are considered the most important predators of the clover mite.

Since some, for example many coccinellids, are general predators and others are more specific as to the species on which they feed, it is best to know more than what species prey on what

other species. It is highly important to know the abundance, the habitat, and specificity of a predator. I have made observations on predators of the clover mite in six types of habitats: walls of dwellings; basal portion of tree trunks, such as American elm and several species of maple; the crowns of fruit trees (apple, Siberian crab, pear, cherry, peach, etc.); the crowns of English elm trees (*Ulmus procera* Salisb.); unmowed grassy fields; and honeysuckle bushes (*Lonicera* sp.) (Table 1).

On the walls of dwellings, I observed *Raphignathus* sp., a mite, to be the most abundant predator; however, I do not think it to be an effective one, because I observed it feeding only on the egg stage of the clover mite. *Bdella depressa* Ewing, a snout mite, and *Salticus scenicus* (Clerck), the Zebra spider, are more ravenous and feed on all stages of the clover mite. However, I did not find these two species abundant enough in this habitat to reduce the clover mite population to a point where it was no longer a nuisance problem.

On the basal bark of trees, I found *Bdella depressa* (see Snetsinger, 1956) and *Typhlodromus fallacis* (Garman) to be the most important predators of the clover mite. I also found *Acaropsis* sp., a cheyletid mite, and the same species of raphignathid mite which I found abundant on the walls of dwellings. I do not, however, think these two species are important predators of the clover mite on the basal bark of trees, because I observed them feeding only on the egg stage.

On fruit trees, *Typhlodromus pomi* (Parrott) and *T. rhenanus* Oudms. appeared to be the most important clover mite predators. Fruit trees treated with DDT alone commonly showed serious damage by the clover mite. However, if the DDT treatments were stopped and the trees remained unsprayed, these two species of *Typhlodromus* increased enough in numbers in 2 to 4 years to reduce the clover mite population to a point where serious injury to the fruit trees no longer occurred. Of the two species, *T. pomi* seemed more tolerant of insecticides; however, *T. rhenanus* appeared to be the more effective of the two in reducing spider mite populations to low levels. *Stethorus punctum* (Lec.), a small black coccinellid

beetle; *Adalia bipunctata* (L.), the two-spotted lady beetle; and *Scolothrips pallidus* (Beach), a thrips, also appeared to be of some importance as predators of the clover mite on fruit trees.

On the English elm, *Typhlodromus fallacis* and *Leptothrips mali* (Fitch) were the two most important predators of the clover mite. In grassy fields, *T. fallacis* and *Bdella depressa* were the most important. A species of parasitid mite was also common in this habitat, but it did not appear to be important. On honeysuckle bushes, *T. fallacis* appeared to be the only important predator.

At Urbana, *Bdella depressa* and three species of *Typhlodromus* comprised about 75 per cent of the total number of predators collected from the six habitats studied. These, to be sure, are the most important predators of the clover mite since they are ravenous feeders on all stages of it and occur in several of the habitats. Specimens of *Stethorus punctum, Adalia bipunctata, Scolothrips pallidus, Leptothrips mali,* and *Salticus scenicus* constituted about 7.8 per cent of the total predators collected. These species are also excellent predators upon the clover mite; however, they occurred in important numbers in only one of the habitats studied. The remainder of the predators were never abundant enough to be effective in reducing clover mite populations, feeding only incidentally or on only one stage of the clover mite.

ACKNOWLEDGMENTS

The author is indebted to the following members of the Illinois Natural History Survey staff: Dr. George C. Decker and Dr. L. L. English for their advice; Dr. Lewis Stannard for aid in thrips and mite identification; and Dr. Milton W. Sanderson for identification of coccinellid beetles. He also has been aided in the identification of typhlodromid mites by Dr. H. H. J. Nesbitt of Carleton University, Ottawa, Canada; the identification of bdellid and raphignathid mites by W. T. Atyeo, Department of Entomology, University of Nebraska; and in the identification of a cheyletid mite by Dr. Edward W. Baker, U. S. National Museum, Washington, D. C.

TABLE 1.—Tabulation of Clover Mite Predators Collected in Six Habitats from 1954–1958

Name of Predator	Number of Specimens Collected from:							
	Walls of Dwellings	Basal Portion of Trees	Crowns of Fruit Trees	Crowns of English Elm Trees	Unmowed grassy Areas	Honey-suckle Bushes	Total from All Six Habitats	Per Cent of Total Number of Predators
Bdella depressa	56	1382	16	—	107	—	1561	33.93
Acaropsis sp.	3	158	—	—	—	—	161	3.50
A species of Parasitidae	—	—	—	—	76	—	76	1.65
A species of Erythraeidae	—	—	—	—	—	1	1	.02
Typhlodromus fallacis	9	320	—	210	559	23	1121	24.37
T. pomi and *T. rhenanus*	—	—	760	—	—	—	760	16.55
Raphignathus sp.	387	46	—	—	—	—	433	9.43
Pardosa sp.	1	—	—	—	—	—	1	.02
Phidippus audax	9	1	—	—	—	—	10	.22
Salticus scenicus	52	9	—	—	—	—	61	1.33
Lamprochermes oblongus	—	27	—	—	—	—	27	.59
Scolothrips pallidus	—	5	37	9	—	3	54	1.17
Haplothrips americanus	—	18	—	—	—	—	18	.39
Leptothrips mali	—	2	14	82	—	—	98	2.13
Orius minutus	—	3	—	—	—	—	3	.07
Chrysopa sp.	—	1	9	8	3	1	22	.48
Adalia bipuncata	—	3	36	3	10	3	55	1.20
Cycloneda munda	—	2	19	1	—	—	22	.48
Hippodamis convergens	—	4	14	5	—	—	23	.50
Stethorus punctum	—	8	62	9	8	2	89	1.93
Arthrocnodax sp.	—	—	—	—	—	—	2	.04
Syrphid larvae	—	—	1	—	—	—	1	.02
Total number of predators							4599	

LIST 1. Reported Predators of the Clover Mite

	ORDER ARANEAE
Epeiridae:	*Araneus cucurbitinus* Clerck. (Chant, 1956).
	Cyclosa conica (Pallas). (Chant, 1956).
Linyphiidae:	*Entelecera acuminata* (Wider). (Chant, 1956).
	Erigonidium graminicola (Sundevall). (Chant, 1956).
Lycosidae:	**Pardosa* sp.
Salticidae:	**Phidippus audax* (Hentz).
	**Salticus scenicus* (Clerck).
Thomisidae:	*Misumena vatia* (Clerck). (Chant, 1956).
	ORDER ACARI
Anystidae:	*Anystis agilis* Banks. (Lord, 1949).
Bdellindae:	**Bdella depressa* Ewing. (Snetsinger, 1956).
Cheyletidae:	**Acaropsis* sp. (probably undescribed).
Parasitidae:	*(Species undetermined).
Erythraeidae:	*(Species undetermined).
Phytoseiidae:	*Typhlodromus aberrans* Oudms. (Mathys, 1957).
	T. cucumeris Oudms. (Anderson and Morgan, 1958).
	**T. fallacis* (Garman).
	T. finlandicus Oudms. (Mathys, 1957).
	**T. pomi* (Parrott).
	**T. rhenanus* Oudms. (Anderson and Morgan, 1958).
	T. tiliae Oudms. (Lord, 1949).
Raphignathidae:	*Mediolata novae-scotiae* Nesbitt. (Lord, 1949).
	M. (Zetzellia) zackeri Oudms. (Döhring, 1952).
	**Raphignathus* sp. (to be described by Atyeo, Baker, and Crossley).
	ORDER PSEUDOSCORPIONIDA
Chernetidae:	**Lamprochermes oblongus* (Say).

* Asterisk denotes species observed by the author to be predaceous on the clover mite.

ORDER CORRODENTIA

Atropidae: *Lepinatus patruelis* Pearm. (Rack, 1956). (feeds on eggs, shells, molt skins, etc.).

ORDER THYSANOPTERA

Thripidae: **Scolothrips pallidus* (Beach).
S. sexmaculatus (Pergande). (Baily, 1939).

Phloeothripidae: **Haplothrips* (*Karnyothrips*) *americanus* (Hood).
H. faurei Hood. (Lord, 1949).
**Leptothrips mali* (Fitch). (Bailey, 1940).

ORDER HEMIPTERA

Anthocoridae: *Anthocoris antevolans* White. (Anderson and Morgan, 1958).
A. melanocerus Reut. (Anderson and Morgan, 1958).
A. numorum (L.). (Kremer, 1956).
A. sp. (Anderson and Morgan, 1958).
**Orius minutus* (L.). (Kremer, 1956).

Miridae: *Campylomma verbasci* (Meyer). (Lord, 1949).
Diaphnidia pellucida Uhler. (Lord, 1949).
Hyaliodes harti Knight (Lord, 1949).
Malacocoris chlorizans Panzer. (Mathys, 1957).
Pilophorus perplexus Douglas and Scott. (Lord, 1949).

ORDER NEUROPTERA

Chrysopidae: Chrysopid larva. (Böhn, 1954).
**Chrysopa* sp.

Coniopterygidae: *Conwentzia psociformis* (Curtis). (Withycombe, 1924).

Hemerobidiidae: Hemerobridium larva. (Böhn, 1954).

ORDER LEPIDOPTERA

Tinaeidae: *Tineola biselliella* Hummel. (Webster, 1912).

ORDER COLEOPTERA

Coccinellidae: **Adalia bipunctata* (L.). (Anderson and Morgan, 1958).
A. frigida Schn. (Anderson and Morgan, 1958).
Chilocorus stigma Say. (Anderson and Morgan, 1958).
Coccinella transversoguttata nugatoris Muls. (Anderson and Morgan, 1958).
C. transversoguttata quineuenotata Kby. (Anderson and Morgan, 1958).
**Cycloneda munda* (Say).
C. sanguinea (L.). (Anderson and Morgan, 1958).
Eriopis connexa Germ. (Guida and Bruhn, 1956).
**Hippodamia convergens* Guer.
Psyllobora taedata Lec. (Weldon, 1914).
P. sp. (Anderson and Morgan, 1958).
Stethorus picipes Csy. (Anderson and Morgan, 1958).
S. punctillum Weise. (Putman, 1955).
**S. punctum* (Lec.). (Böhn, 1954).
S. vagans Blkb. (Evans, 1942).

ORDER DIPTERA

Cecidomyidae: **Arthrocnodax* sp.
Syrphidae: *Syrphid larva.

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A Remarkable form of Sexual Dimorphism in a Centipede (Chilopoda: Lithobiomorpha: Lithobiidae)

By R. E. CRABILL, JR., Smithsonian Institution, Washington, D. C.

It is well known among students of Chilopoda that when sexual dimorphism is at all apparent in centipedes, it nearly always manifests itself in relatively few structures at the hind end of the body. The presence of egg claspers only in female anamorphic centipedes, the frequent intersexual differences in shape and position of the gonopods of the Epimorpha, the often pronounced secondary sexual modifications in the last one or two pairs of legs of some male lithobiomorphs, the swollen ultimate legs of many male geophilomorphs, the sexually dimorphic differences in shape and size of certain posterior tergites and sternites in some species—all represent familiar and predictable instances of sexual dimorphism. All seem directly or indirectly associated with some phase of reproduction, and all are manifest in posterior structures. To this list may be added two notable dimorphic characters involving the entire body. In most female centipedes over-all body size tends to exceed that of the males, and most geophilomorph females have pedal segment numbers whose modes tend to be higher than those of conspecific males. In contrast to the foregoing, examples of conspicuous sexual differences in *anterior* body structures are virtually unknown and must be presumed to be exceedingly uncommon in nature.

Some years ago Mr. R. L. Hoffman presented me with a collection of small lithobiids which he had captured in the mountains of southwestern Virginia. Several of these specimens, all females, were readily identified as *Paitobius zinus* (Chamberlin),[1] a rather uncommon and distinctive montane species.

A subsequent collection included what was clearly a male of *zinus*, a specimen unlike any of which I had ever seen or read. Its prehensors were not of the short, robust type that is essentially unvarying in general form in both sexes throughout the order. Instead, they were enlarged and more elongate, curiously distorted, and grotesque even for a chilopod.

It seemed reasonable at the time to regard the whole prehensorial apparatus as anomalous, a teratoid freak of development, unique and not normally duplicable. The examination of additional *zinus* specimens showed, however, that this explanation was incorrect. The total, final series consisted of a dozen females, each with normal prehensors, and of eight males, each with the aberrant prehensors of the original male. Such evidence suggests that the prehensors of this species are regularly sexually dimorphic.

Fig. 3 presents a dorsal view of the male's head and associated structures. The enormous prehensors are seen *in situ* extending widely laterally from the basal underside of the head: the left prehensor is flexed, the right is partly extended. Note the extraordinary width of their basal axis and their remarkable projection forward. By contrast, the female's prehensors are but slightly exposed laterally and not at all exposed anteriorly.

[1] *Paitobius*, a heterogeneous group, is largely restricted to the middle and southern Appalachian Mountains. The reader is referred for its identification to R. V. Chamberlin, Bull. Mus. Comp. Zool. Harvard 57(6): 279, 1922. The present form belongs to that ensemble of species characterized by the presence of an inner accessory claw on the ultimate pretarsus, and tergital productions only on 11 and 13. It may be distinguished from these through its possession of the following additional characters in combination: apices of prosternal teeth straight or slightly recurved, not procurved; 13D + 14D = 10311, 14V = 01331; female prehensors normal but those of male modified as described below. To date *zinus* has been recorded from Virginia, North Carolina, Tennessee, Georgia, and Alabama.

Figs. 1 and 2, respectively, represent in ventral aspect the male and female prehensorial structures. They are comparably enlarged and prepared from specimens of about the same body size. The most notable specific departures of the male apparatus include the following:

The trochanteroprefemur (j) is relatively longer, thinner, and more cylindrical that that of the female. Its outer surface in outline is almost perfectly straight, and its inner surface bears a conspicuous swelling toward its distal end. It is particularly interesting to note that the ventral condyle (b) is displaced nearly to a lateral position from its normal location under (ventral to) the concealed dorsal condyle (k). (Cf. fig. 2, k, b.) In most chilopods these condyles more or less overlie one another; moreover, similar but less pronounced lateral displacement of the ventral condyle is characteristic only of the Scutigeromorpha. Although it is tempting to speculate upon the possibility that this lithobiid prehensor evidences certain atavistic features reflective of the common evolutionary stem from which the Lithobiomorpha and Scutigeromorpha probably arose, I believe that the condylic displacement in *zinus* males has a simpler explanation. The similarity is probably only analogous, an example of convergency, since, from the purely mechanical standpoint, comparably long and heavy telopodites of this sort probably require comparable basal articulatory devices if they are to function effectively. We must not forget that the genetic factors that gave rise to the long, ponderous telopodites had also to provide for their effective operation. If this were not the case, then, burdened with appendages of little or no use for capturing and subduing prey, the males would undoubtedly die of starvation before reaching sexual maturity, and the pertinent causative gene or genes might be expected to vanish with them.

Of particular significance is the length-to-width ratio of the intermediate articles, i.e., of the femoroid (i) and tibioid (h). Note that in the male each is much longer than wide. In the female, and in all other lithobiomorphs, each article normally is much wider than long. Again, the intermediate articles of the male are curiously suggestive of their homologues in the Scutigeromorpha and of none in any other order.

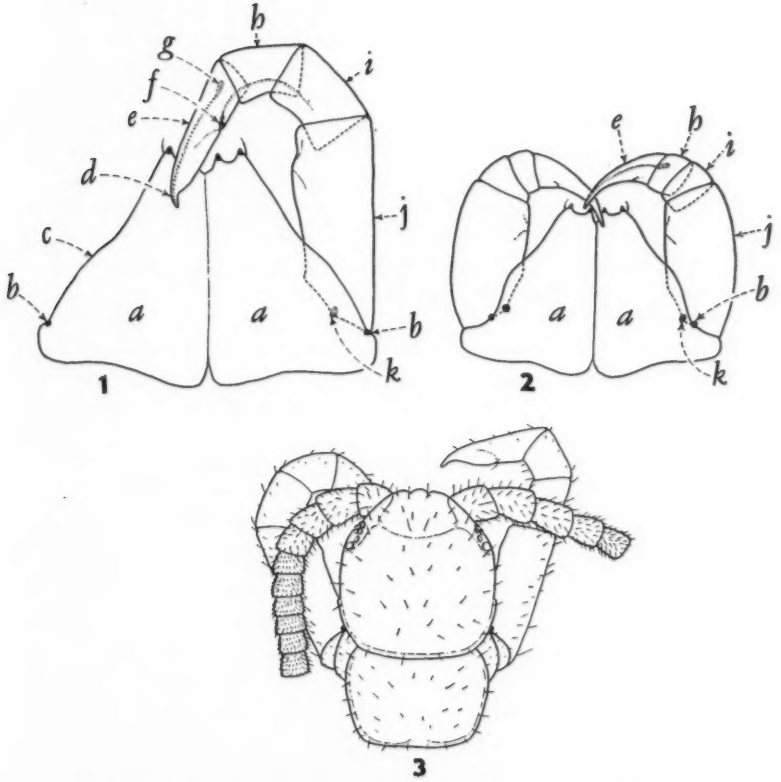

FIG. 1. Prosternum and left prehensor of male. Ventral aspect; all setae deleted. a + a = prosternum, morphologically the two imperfectly fused coxal portions of the telopodites. b = ventral condyle. c = lower lateral bulge of prosternal margin. d = modified apex of tarsungula. e = tarsungula. f = vestigial division of tarsal and pretarsal portions of tarsungula; also point of attachment of pretarsal depressor ligament (represented in dashes). g = poison calyx with distally extending poison canal. h = tibioid. i = femoroid. j = trochanteroprefemur, morphologically the fused trochanter and prefemur (2nd trochanter). k = dorsal, concealed condyle.

FIG. 2. Prosternum and both prehensors of female. Ventral aspect; all setae deleted. Letter designation as in fig. 1.

FIG. 3. Head and adjacent structures of male. Dorsal aspect. All setae shown; part of each antenna deleted.

The male's tarsungula (e) is unique. Fig. 1 shows that the tarsal portion,[2] which is proximal to (f), is essentially normal if we discount its being greatly flattened dorso-ventrally, but the ungular portion distal to (f) is most peculiar. It is flattened dorso-ventrally, its dorsal and ventral surfaces being nearly appressed, and it is very weakly attenuate except at its extreme tip which is abruptly pointed. (Cf. fig. 2.) The condition is probably unique among centipedes. Note too that the pretarsal depressor ligament attaches at its customary position (f), and that the poison calyx (g) is normal in shape and size but housed entirely within the tarsal portion. In the female it extends into the tibioid. Finally, the male's prosternum (a + a) has oddly raised lateral margins, whereas on each side of the midlongitudinal suture its surface is broadly concave. In the female the margins are not raised, and the ventral surface is slightly convex.

On the basis of such a small series of specimens, and in view of our total ignorance of chilopod genetics, it is not possible convincingly either to suggest how this peculiar condition arose, or to speculate upon its possible evolutionary implications. Our few observations suggest the possibility of its being regularly present in the males and regularly absent in the females, but we do not know that this is actually the case. The possibility that this aberrant structure occurs in *some* unexamined females or that it is absent in *some* unexamined males, for instance, would have an important bearing upon the question of its genetic basis, for if this were true, we might reasonably suspect some form of sex-linked rather than of sex-limited inheritance to be involved.

It is reasonable to suggest at least that the character is the phenotypic expression of a genetic mutation of some sort that is either: (A) more frequent or widespread in the males than in the females, for which it may or may not be lethal; or: (B) it is common to some or to all males and to no females.

[2] The tarsungula of the Lithobiomorpha, Geophilomorpha, and Scolopendromorpha represents an amalgamation of the morphological tarsus and pretarsus. Only in the Scutigeromorpha are they discrete, preserving their original identities.

Finally, the practical lesson here for descriptive systematics can hardly be avoided. It is not extreme to assert that many competent taxonomists familiar with lithobiid systematics, if confronted with just one bizarre male (but with no females) of this form, could justifiably be misled into suspecting it to represent at least a new species and probably a new genus, if not the basis for some suprageneric category.

A New Species of Typhlodromus (Acarina: Phytoseiidae) from Oregon [1]

By Clive D. Jorgensen [2] and D. A. Chant [3]

Chant (1957) divided the genus *Typhlodromus* Scheuten, 1857, into two subgenera: *Typhlodromus* s.str.; and *Amblyseius* Berlese. An undescribed species of mite of the subgenus *Amblyseius* is described below.

Typhlodromus (Amblyseius) crataegi new species

Female. Length 498 μ; width 325 μ. Dorsal shield smooth, almost covering idiosoma, and with 17 pairs of simple setae, nine in the lateral, two in the median, and six in the dorsal rows (Fig. 1). Setae L_4, L_9, and M_2 long (39, 69, and 57 μ, respectively). Setae D_2, D_3, D_4, D_5, D_6, and M_1 short (7–15 μ). Remaining setae of medium length (27–30 μ). Four pairs of anterior lateral setae. Seta M_1 on slight protuberance. Seta M_2 nearly level with and 22 μ mesad of L_7. Seta L_4 120 μ from L_6, 89 μ from L_5. One small pore between L_6 and L_7 and another anterior to M_2.

Setae S_1 and S_2 on interscutal membrane, 104 μ apart, and both 25 μ long. Sternal shield normal for the genus, with three pairs of setae, and with posterior margin slightly concave. Three sternal setal pairs 62, 76, and 98 μ apart, respectively, from S_1. Fourth pair of sternal setae on metasternal plates.

[1] Technical Paper No. 1279, Oregon State College.
[2] Mid-Columbia Branch Experiment Station, Hood River, Oregon.
[3] Entomology Research Institute for Biological Control, Belleville, Ontario.

Genital shield normal for the genus, with one pair of setae. Four long slender platelets on membrane between genital and ventrianal shield. Ventrianal shield approximately triangular, 131 μ wide, 156 μ long, with three pairs of preanal setae and a pair of pores (Fig. 2). Para-anal setae level with anterior margin of anus. Post-anal seta 13 μ behind anus. Preanal setae 32 μ long and aberrant on one side in the holotype. One pair of small platelets anterolaterad of ventrianal shield. Four pairs of setae on membrane surrounding shield, one, VL_1 long (62 μ). Two pairs of narrow, slightly curved metapodal plates, one longer. Coxal gland bell shaped (Fig. 3).

Peritremal plate broad, extending posteriorly around base of coxa IV, with posterior margin truncate and median angle long and narrow. Stigmata laterad of coxa IV, with a pore slightly behind. Plate fused with dorsal shield anteriorly, peritreme extending to level of D_1.

Leg IV with three macrosetae, genu, tibia, and basi-tarsus. Macroseta on basi-tarsus long (72 μ), others short. Gnathosoma and maxillary palps normal for the genus. Fixed digit of chelicera 37 μ long, with three teeth and *pilus dentilis;* movable digit 32 μ long, with one tooth.

Male. Unknown.

Diagnosis. This species runs to *T.* (*A.*) *fraterculus* (Berl.) in Chant's keys (in press). It is separated from *fraterculus* by the longer setae L_5 to L_8 and by differences in the shape of the ventrianal shield. Moreover, *fraterculus* has three long macrosetae on leg IV whereas *crategi* has only one.

Locality and type material. Holotype female collected from leaves of hawthorn (*Crataegus columbiana* Howell), Hood River, Oregon, June 4, 1958, by the senior author; No. 6860 in the Canadian National Collection, Belleville. Repeated collections have failed to yield additional material.

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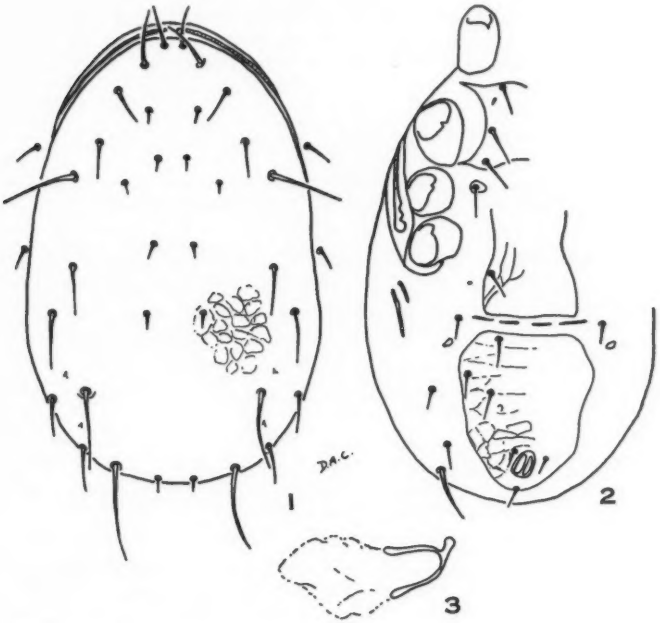

FIGS. 1–3. *Typhlodromus* (*Amblyseius*) *crataegi* new species, female: 1, dorsal shield; 2, ventral surface; 3, coxal gland.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Agapema galbina. Will exchange cocoons of this moth for nature books. E. Frizzell, Route 4, Box 96, San Benito, Texas.

Tenebrionidae of the World wanted, in exchange for insects of Argentina and neighboring countries. Horacio J. Molinari, Av. Lib. Gral. San Martin 55, Acassuso (Buenos Aires), Rep. Argentina.

Butterflies. Wish to exchange specimens for Japanese species. Please write to Ichiro Nakamura (Boy, age 16), 26 Aza-Nichiyama Obayashi Takarazuka-shi, Hyogo-Ken, Japan.

Phasmidae of nearctic area desired alive. Purchase or trade, drawing on large stock of major orders, worldwide. Domminck J. Pirone, Dept. Entomology, Cornell University, Ithaca, N. Y.

Nitidulidae and Rhizophagidae wanted in exchange for European beetles of all families. O. Marek, Zămberk 797, Czechoslovakia.

Wanted and Needed. We are compiling a history of entomology, and particularly, at present, of the amateur insect clubs that flourished 50 to 75 years ago. Will you who have knowledge of such early clubs or societies advise me, giving facts on the time of existence, members, etc., which you may have. J. J. Davis, Dept. of Entomology, Purdue University, Lafayette, Indiana.

Cockroaches (Blattoidea) of Japan, Okinawa, Formosa (Taiwan), and the Philippines are being studied in cooperation with Dr. K. Princis. Loans of specimens from that area are desired. A. B. Gurney, U. S. National Museum, Washington 25, D. C.

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A TAXONOMIC STUDY OF THE NORTH AMERICAN LICININI WITH NOTES ON THE OLD WORLD SPECIES OF THE GENUS DIPLOCHEILA BRULLE (COLEOPTERA)

By George E. Ball

258 pages of text, 75 tables, 3 diagrams, 15 plates, table of contents and index

This monograph considers the geographical variation, relationships, evolution and taxonomy of the carabid tribe Licinini. A general treatment, explaining the taxonomic approach used, definition of terms, criteria for delimiting species and subspecies, etc., precedes the systematic position. The genera *Diplocheila* (subgenera *Diplocheila, Neorembus, Isorembus*), *Dicaelus* (subgenera *Paradicaelus, Dicaelus, Liodicaelus*) and *Badister* (subgenera *Badister, Trimorphus, Baudia*) are each treated in some detail. Keys to the genera and species are given throughout as well as a description (or diagnostic notes), variation, distribution and frequently locality records for each of the forms treated. The phylogeny and zoogeography of each genus are discussed in a separate section. Variation of mensurable characters is treated in the 75 tables. Fifteen plates depict structural (including genitalia) and variational features of the species discussed.

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